

Serial No. : 10/657,470
Filed : September 8, 2003

REMARKS

Claims 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16 and 18-52 are pending where Claims 1, 3, 4 and 6-7 have been considered by the examiner while the other claims are not considered by the examiner because they are species not elected by the applicant in response to the election requirements.

In the Office Action, the examiner rejected Claims 1 and 7 under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. (U.S. Patent No. 6,407,791). The examiner rejected Claims 3, 4 and 6 under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. (U.S. Patent No. 6,407,791) in view of Shimoshikiryo (U.S. Patent No. 6,958,791).

With respect to the rejection under 35 U.S.C. 103(a) based on the cited Shimoshikiryo (U.S. Patent No. 6,958,791) reference, the applicant respectfully requests that the cited Shimoshikiryo reference be disqualified as a prior art. The present invention claims the benefit of the prior foreign filing based on two Japanese Patent Applications, JP 2002-316865 filed September 10, 2002 and JP 2003-110895 filed February 26, 2003. The U.S. filing date of the cited Shimoshikiryo reference is "June 6, 2003" which is later than the foreign filing date "September 10, 2002" (JP 2002-316865) of the instant application. Although the cited Shimoshikiryo reference claims the benefit of foreign filing dates, one of which is June 6, 2002, this date is not applied to the determination of prior art

Serial No. : 10/657,470
Filed : September 8, 2003

under 35 U.S.C. 102(e) against the present invention (see "In re Hilmer").

The applicant submits herewith a certified English translation of the certified original application JP 2002-316865 previously submitted. As shown in the English translation, all of the features defined in Claims 1, 4 and 7 are disclosed in the JP 2002-316865. Since the priority date of the present application precedes the U.S. filing date of the cited Shimoshikiryō reference, the applicant respectfully submits that Shimoshikiryō (U.S. Patent No. 6,958,791) be disqualified as a prior art against the present invention.

With respect to the rejection to Claims 1 and 7, the applicant has amended Claims 1, 4 and 7 to more clearly differentiate the present invention from the technology disclosed by the cited Suzuki et al. reference. More specifically, the applicant has amended Claims 1, 4 and 7 to include the feature that the transparent pixel electrode and the liquid crystal alignment direction control electrode in each pixel of the active matrix substrate are driven separately from one another. This feature is supported by the original disclosure of the instant application, for example, by the timing charts of Figures 11 and 12 and the descriptions in the specification associated with the timing charts that the waveform 21 of the transparent pixel (common) electrode and the waveform 25 or 26 of the liquid crystal alignment direction control electrode are different in the waveform and potential.

Serial No. : 10/657,470
Filed : September 8, 2003

Because of this structure in which the transparent pixel electrode and the liquid crystal alignment direction control electrode in each pixel of the active matrix substrate are driven separately and independently from one another, it is possible to establish a relatively large voltage difference between the transparent pixel electrode and the liquid crystal alignment direction control electrode, even though a drive voltage supplied to the transparent pixel electrode is not so large. As a consequence, it is possible to use a low cost IC as a video signal driver IC which also reduces power consumption.

In contrast, the pixel electrode disclosed by the cited Suzuki et al. reference is in a floating state. Namely, a video signal supplied to the pixel electrode is transmitted to the control electrode connected to the thin film transistor (TFT) via a capacitance coupling. Thus, in the technology of the cited Suzuki et al. reference, to fully activate the liquid crystal molecules, it is necessary (1) to extremely increase the value of the capacitance configured by the pixel electrode and the control electrode, and (2) to apply a video signal of a very large voltage to the pixel electrode for driving the TFT.

Especially, in the vertically aligned mode liquid crystal display, since the liquid crystal layer having a negative dielectric constant is used, it is usually necessary to use drive signals of voltages higher than that used in the TN mode. Thus, in the method of the cited Suzuki et al. reference, the voltage of the video

Serial No. : 10/657,470
Filed : September 8, 2003

signal must be even higher, which increases the cost of driver ICs and also the power consumption.

Further, in the present invention, because the transparent pixel electrode and the liquid crystal alignment direction control electrode in each pixel of the active matrix substrate are driven separately and independently from one another, it is possible to make the size of the liquid crystal alignment direction control electrode small. This means that it is unnecessary to establish the liquid crystal alignment direction control electrode with use of Indium-Tin Oxide (ITO), thereby enabling to form the liquid crystal alignment direction control electrode and the scan signal wiring on the same layer at the same time. As a consequence, because it is possible to produce the active matrix substrate of the present invention through the same production process for the conventional active matrix substrate, the production cost will not increase (see page 23, lines 26-29).

In contrast, in the active matrix substrate disclosed by the cited Suzuki et al. reference, both of the transparent pixel electrode and the liquid crystal alignment direction control electrode are made of ITO (column 10, lines 51-53, column 12, lines 41-56, column line 14 lines 17-18, etc.). This is because, as noted above, since the video signal supplied to the pixel electrode is transmitted to the control electrode connected to the thin film transistor (TFT) via the capacitance coupling, it is necessary to increase the size of the liquid crystal alignment direction control

Serial No. : 10/657,470
Filed : September 8, 2003

electrode. However, if the liquid crystal alignment direction control electrode of large size is established by a metal electrode, which is not transparent, the brightness will be deteriorated because of the decrease of the aperture ratio.

Thus, in the cited Suzuki et al. reference, it is necessary to use ITO for both the transparent pixel electrode and the liquid crystal alignment direction control electrode. Accordingly, it is not possible to form the liquid crystal alignment direction control electrode and the scan signal wiring on the same layer at the same time, which increases the production process. Further, since ITO is expensive material, the production cost will increase.

As discussed above, since the essential feature of the present invention is not shown or suggested by the cited Suzuki et al. reference, and the cited Shimoshikiryō reference should be disqualified as a prior art, the applicant believes that the rejection under 35 U.S.C. 103(a) is no longer applicable to the present invention.

In this opportunity, the applicant has added new claims, i.e., Claims 53 and 54, which are dependent upon Claims 4 and 7, respectively. The new claims are directed to the feature that "the liquid crystal alignment direction control electrode in one row of the active matrix substrate is driven separately from that in another row of the active matrix substrate". This feature is supported by the original disclosure of the instant application, for example, at page 24, lines 3-9.

Serial No. : 10/657,470
Filed : September 8, 2003

In this opportunity, the applicant has amended other claims to correct minor wording problems therein.

Further in this opportunity, the applicant has amended the specification to correct wording errors therein and to more clearly describe the present invention. This is to verify that no new matter has been introduced by this amendment. The applicant has also amended the abstract of the disclosure to be consistent with the amendment in the claims and reduce the number of words to less than 150 to meet the written disclosure requirements.

Under the circumstances, the applicant believes that the present application is in the condition for allowance, and the applicant respectfully requests that the present application be allowed and passed to issue.

Respectfully submitted,

MURAMATSU & ASSOCIATES

Dated:

6/19/2008

By:

Yasuo Muramatsu
Yasuo Muramatsu
Registration No. 38,684
Attorney of Record
114 Pacifica, Suite 310
Irvine, CA 92618
(949) 753-1127

AMD-KN08.002
061808